IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 17, Issue 12 Ver. 4 (December. 2018), PP 08-14
www.iosrjournals.org

I-Gel versus Laryngeal Suction Tube- II: Comparison of Two Supraglottic Airway Devices in Elective Surgical Procedures

[1]Vanilla Chopra, [2]Nandita Mehta, [3]Loveleen Kour*
[1]MD,Associate professor. Shri mata vaishno devi narayana superspeciality hospital , katra.
[2]MD,Professor and Head, Department of Anaesthesia and Intensive care ASCOMS , Sidhra.
[3]MD Anaesthesia,Senior resident, Department of Anaesthesia and Intensive care GMC Jammu.
** Corresponding author: Loveleen Kour**

ABSTRACT
Context: Supraglottic airway devices have been established in clinical anesthesia practice and have been previously shown to be safe and efficient. Two new supraglottic airway devices, I-gel and laryngeal suction tube-II offer potential benefits when used in elective surgical procedures.
Aims: The objective of this study was to compare I-Gel with LTS II to determine device performance during general anesthesia and controlled ventilation, by comparing the ease of insertion, number, and duration of insertion attempts and complications among the two devices.
Settings and Design: This study was conducted as randomized controlled study in a teaching hospital.
Subjects and Methods: Sixty patients undergoing elective surgical procedures of 60-90 minutes duration were randomly divided in two groups of thirty each, I-gel (Group I) or LTS II (Group L) group. Anesthesia was induced with standard drugs and the supraglottic airway device was inserted. The following parameters were noted: hemodynamic changes ease and time required for insertion, successful placement of device, correct placement of nasogastric tube and post-operative morbidity (dysphagia, sore throat)
Statistical Analysis Used: Descriptive analyses were expressed as a mean ± standard deviation and proportions or percentage as appropriate. Data are presented as mean ± standard deviation and proportions or percentage as appropriate. Data comparison was performed by Student's t-test (continuous variables) and chi-square test (categorical variables). A significant difference was assumed with p-value less than 0.05.
Results: I-gel was significantly easier to insert with success rate of 100% on first attempt (P< 0.010) as compared to 93.33% for the LTS II. The airway of two patients could not be managed with LTS II after two attempts, and were thus intubated with endotracheal tube. More patients complained of sore throat with LTS II than I-gel (13.33% vs10.00%) at 6hrs post-extubation.
Conclusion
I-Gel is a supraglottic device which is easier to insert with increased likelihood of successful insertion on first attempt and less traumatic with lower incidence of sore throat. Hence I-Gel can be a good alternative to LTS II, though both devices provide a secure airway.
Kew Words*: Laryngeal tube suction II, I-Gel, Supraglottic airway devices.*

Date of Submission: 27-11-2018 Date of acceptance: 10-12-2018

I. Introduction

In our study the I-gel and Laryngeal tube suction II (LTS-II) are the two supraglottic airway devices in comparison. The Laryngeal Tube Suction II (LTSII; VBM, Medizintechnik, Sulz, Germany) is the most recent version of the Laryngeal Tube (LT) family of supraglottic airway devices, originally intended for emergency airway management, but which is currently also used during general anaesthesia (1–3). The LTS II is a double lumen version of LT, which has a ventilating tube and esophageal drainage tube that allows passage of a gastric tube into the esophagus. (4,5). LTSII were initially envisioned as alternatives to the Laryngeal Mask Airway in mechanically ventilated patients during general anesthesia. However, we have insufficient data as to the performance of the LTSII during general anesthesia (6, 7) in spite of its recent inclusion in emergency advanced airway management. (8)

The I-gel (Intersurgical Ltd, Wokingham, Berkshire, United Kingdom) comprises a soft, gel-like, non-inflatable cuff made of thermoplastic elastomer, a widened, flattened stem with a rigid bite-block that acts as a buccal stabilizer to reduce axial rotation and malpositioning, and an oesophageal vent through which a gastric tube can be passed (9)

Comparative studies indicate that the LTS II is generally as effective as the different types of laryngeal mask airway (10,11,12,13) while some studies indicate that the laryngeal mask airway may be more effective

than the standard laryngeal tube under controlled ventilation conditions, in patients undergoing general anesthesia(14).

There has been a lot of interest in these two devices due to their acclaimed advantages, and there have been a number of studies in response to concerns regarding effectiveness and safety of I gel but very few with regard to LTS II. In the current prospective randomized single blinded open study, we tested the hypothesis that the LTSII is as effective a device as I-Gel, with regard to their ease of insertion, stability in delivering positive-pressure ventilation during controlled ventilation and general anesthesia, with minimal complications.

II. Subjects & Methods

With the approval of our institutional ethics committee and after having obtained written informed consent, 60 screened and investigated patients were recruited for this prospective, randomized controlled study. Inclusion criteria were: age 18-65 years and scheduled elective surgical intervention with predicted anesthesia duration between 60 and 90 minutes. Exclusion criteria were: BMI >35 kg/m2, ASA status III or higher, known risk of aspiration, low pulmonary compliance or high pulmonary resistance, pharyngeal or laryngeal pathology. The patients were assigned to their groups i.e. I gel group (Group I) or LTS-II group (Group L), with a computer generated randomisation list. The sealed envelope method was used for randomization.

All the patients are premedicated with tab. alprazolam 0.25mg and tab. pantoprazole 40 mg night prior to surgery. On the day of surgery after intravenous access was established, all patients were taken to the operating room. Standard ASA monitors including blood pressure (BP) cuff, EKG, and pulse oximeter were attached. Baseline vital parameters were obtained and all patients received inj. ondansetron 0.1mg/kg, inj. ranitidine 50 mg and inj. fentanyl 1µ/kg.

After pre-oxygenation general anesthesia was induced with 1.5-2 mg/kg propofol. Once adequate mask ventilation was assured, muscle relaxation was achieved with inj. rocuronium 0.6 mg/kg.

After induction, the patient's head and neck was kept in the neutral position, and the designated lubricated device was inserted by a trained anesthesiologist using a jaw lift approach. To prevent bias, device was inserted by the same anesthesiologist with considerable experience of more than 15 years. In the event of difficulty with device insertion, the patient's neck was repositioned. The time taken to insert the device was recorded in each instance in all groups.

The time required for successful insertion was defined as the time from placing the SGA in the front of the patient's mouth to the time of establishment of manual ventilation via the device. An effective airway was confirmed by bilateral symmetrical chest movement, square waveform on capnograph and normal SpO_2 (>94%) and ventilation was assessed as good, fair, failed. If the airway was not effective, manipulations were done in the form of increasing the depth of insertion, giving jaw thrust, head tilt or chin lift and it was noted. The cuffs of the LTS-II were inflated by recommended manufacturer volumes (Kings Systems, Noblesville, IN, USA). Ease of insertion was determined by the anesthesiologist as 1=very easy, 2=easy, 3=difficult, 4=very difficult. If placement was unsatisfactory as determined by the attending anesthesiologist, placement was reattempted. Total number of attempts was noted with each device. Failed insertion of the device was defined as the inability to position the device in two attempts or an air leak through the drainage channel during positive pressure ventilation despite corrective manœuvres (e.g. deeper insertion or up-and-down-manoeuvre) within 60 sec or inability to introduce a ryle's tube through the gastric drainage port of device. After 2 failed attempts, no further attempts at SGA placement were made, and the airway was secured with appropriate sized endotracheal tube (ETT).Upon completion of the patient's surgery, inhalational agent was discontinued and after giving the reversal, tolerance during emergence i.e. whether the patient is comfortable or there are signs of intolerance like cough, hiccup, retching, vomiting and biting of the airway were noted.

After extubation, the device was inspected for any evidence of blood and the patient's oral cavity for any injury to the lips, teeth, tongue or buccal mucosa . Suction contents (saliva, gastric aspiration, bloody fluid) were also noted.

Additionally, all patients were questioned at 6 and 24 hours postoperatively in order to assess for the presence of sore throat, hoarseness, and dysphagia.

Hemodynamic parameters were recorded at baseline, before device insertion and 1, 3, 5,and 10 minutes after device insertion, and then 1,3,and 5 minutes after extubation.

Statistical analysis of the data was conducted. Data are presented as mean ± standard deviation and proportions or percentage as appropriate. Data comparison was performed by Student's t-test (continuous variables) and chi-square test (categorical variables).A significant difference was assumed with p-value less than 0.05. All analysis was performed using the Statistical Package for Social Science (SPSS for Windows Version 16.0, SPSS Inc, Chicago, IL).

III. Results

The demographic data for each group is summarized in **Table 1**. There was no significant difference between groups with regard to patient characteristics, duration and type of surgery. Additionally, heart rate, systolic blood pressure, diastolic blood pressure and mean arterial pressure, were similar for patients in each group.

The LTS-II and I-Gel groups demonstrated significant differences in successful insertion on first attempt (93.33% vs100% respectively), (p=0.010) .The time taken for successful placement also significantly differ among the two devices with LTS taking more mean time for insertion (8.89+5.49 vs 4.33+1.12 sec). Moreover it was very easy to insert I-gel as compared to LTS II(Table 2).The incidence of manipulation of airways was seen more in LTS II in the form of increasing the depth of insertion of the device as compared to I-gel (26.67% /13.33%) (Fig.1).In most of the patients ventilation achieved was good with I-gel while it was fair with LTS II (p> 0.001).Almost all the patients tolerated both the devices comfortably before extubation. Suction contents were either saliva or blood in both the groups and traces of blood were found more often on the LTS-II (p>0.020) (Table 2). Overall complications were significantly more with LTS II group with sore throat being predominant complication with LTS II at 6 hrs (p>0.021). None of the patient in both the groups had hoarseness or dysphagia or any other complaint at 24 hrs after extubation. The overall incidence of airway morbidity for the intention-to-treat groups was low. (Figure 2)

Table 1: Demographic characteristics

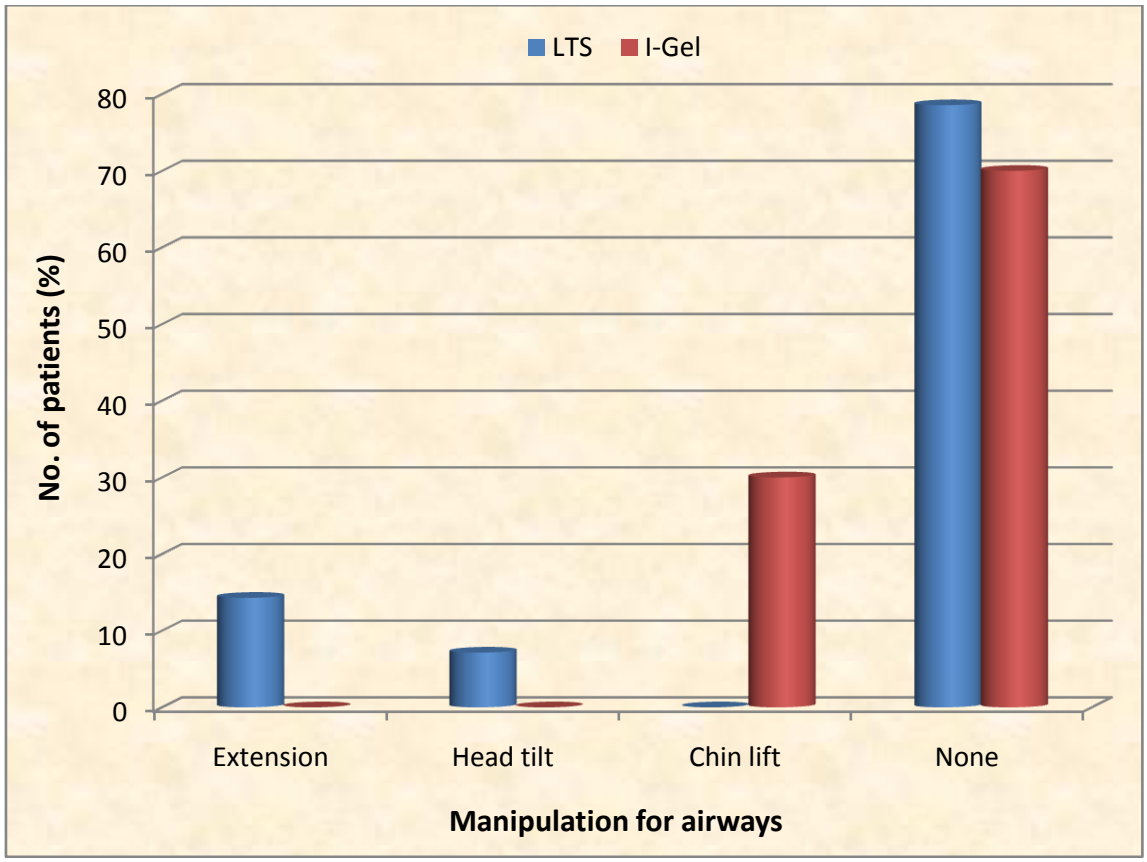
Variables	Group L	Group I	p-value	Remarks
Age (years)	44.71 ± 14.32	40.73 ± 14.69	0.301	NS
BMI (kg m^2)	27.11 ± 3.15	26.90 ± 4.40	0.837	NS
Male/female (%)	20.00/80.00	13.33/86.67	0.213	NS

NS: Non-significant
S: Significant

Table 2: Comparison of different variables

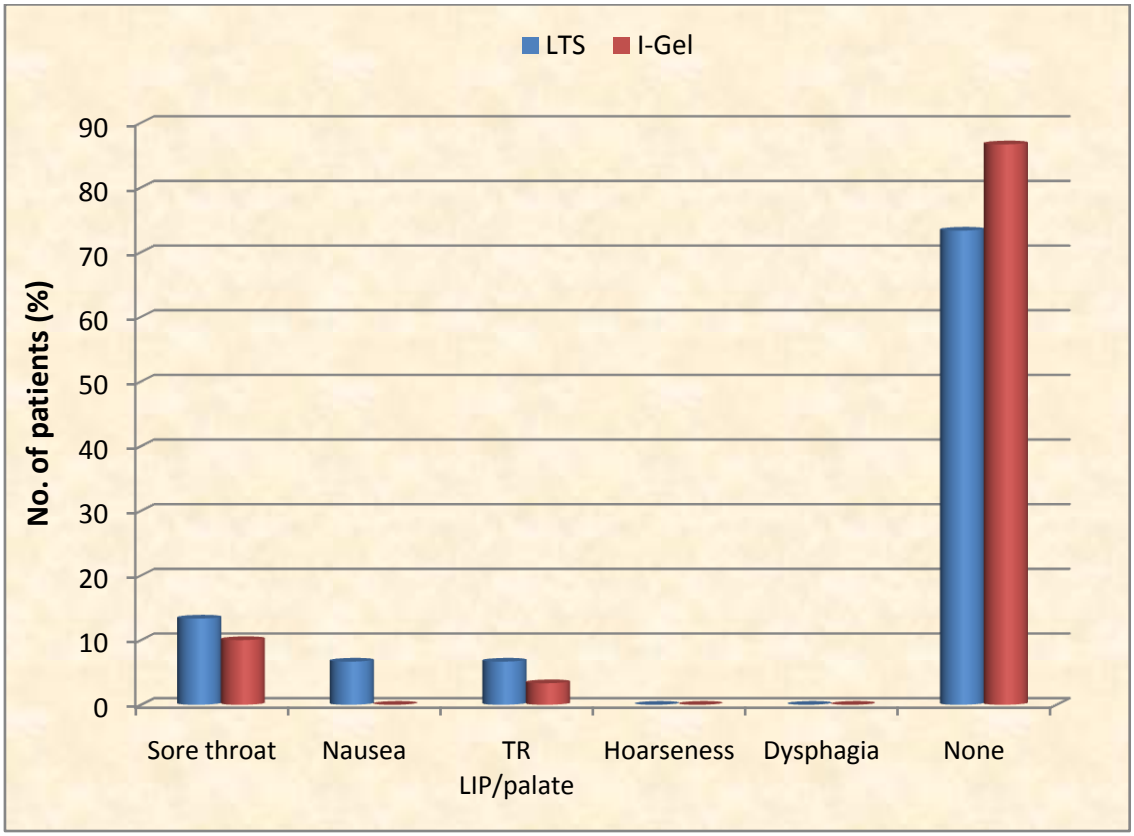
Variables	Number of patients(%)			
	Group L	Group I	P value	Remarks
No. of Insertion attempts (%)			0.010	S
1	28 (93.33)	30 (100.00)		
2	2 (6.67)	0 (0.00)		
Mean insertion time (sec)	8.89±5.49	4.33±1.12	0.002	S
Ease of insertion			0.050	S
V easy	22 (73.33)	25 (83.33)		
Easy	4 (13.33)	3 (10.00)		
Difficult	2 (6.67)	2(6.67)		
V Difficult	2 (6.67)	0 (0.00)		
Ventilation			0.001	S
Good	18 (60.00)	30 (100.00)		
Fair	10 (33.33)	0 (0.00)		
Failed	2 (6.67)	0 (0.00)		
Tolerance (%)			0.071	NS
comfortable	30(100)	29(96.67)		
Cough	0(0.00)	1(3.33)		
Suction contents(%)			0.213	NS
Saliva	24(80.00)	26(86.67)		
Blood	6 (20.00)	4(13.33)		
Blood on device(%)			0.020	S
Yes	8 (26.67)	4 (13.33)		
No	22 (73.33)	26 (86.67)		

NS: Non-significant
S: Significant



MANIPULATION OF AIRWAYS

FIGURE1



Postoperative complication at 6 hrs

FIGURE 2 showing postoperative complications at 6 hrs

IV. Discussion

I-gel and LTS II are the two SGA devices with secondary lumens, which are increasingly being used in surgery requiring general anesthesia and positive pressure ventilation. Each device may have theoretical advantages or disadvantages over other device. However, it is necessary to study the efficacy and safety of each device, and to establish which airway device is more appropriate for surgeries under general anesthesia.

We obtained an overall successful insertion rate of 100% with I-gel and 93.33% for the LTS II in first attempt and 2 patients (6.67%) required second attempt in case of LTS II ($p>0.010$).In a study conducted by Kikuchi et al. (14) it was found that LTSII have significantly reduced first time success rate compared to Proseal LMA (PLMA) which was attributed to the LTSII entering the tracheal inlet instead of the esophagus in 5 of 50 (10%) patients (14).However in various studies conducted on different types of LTS and PLMA, it was found that insertion success rate on first attempt was better with LTS in contrast to PLMA.

In our study it was more difficult to insert LTS-II with mean time taken for insertion was 8.89 sec for LTS II and 4.43sec for I-gel ($p=0.02$). Since no cuff inflation is needed, there is shorter time to achieve effective airway with I-gel in our study. Difficulty in insertion of LTS II is possibly because of the more complex design of LTS II as compared to I-gel. The smooth contiguous surface of the I- gel from the tip of the bowl to the proximal end of the tube, allows the device to easily slide posteriorly along the hard palate, pharynx and hypopharynx . However various studies have reported comparable insertion times for PLMA and LTS (14, 15). This, probably, may be due to the reason that both the devices in their study had inflatable cuff. Placement of gastric tube was successful in all the patients in both the groups with the difference that a wider bore nasogastric tube can be placed more easily in LTS II of corresponding size as compared to I-gel.

The overall requirement of airway manipulations was less in the I-gel group, which is in concordance with the study conducted by Cook and colleagues (16) while Gaitini and colleagues found that the success rate of insertion and the number of adjustments of the LTS II were similar to those for the PLMA (2).

Ventilation achieved was good with I-gel in all the patients (100%) as compared to LTS II in which ventilation was either good or fair (60% /33.33%) respectively. Moreover there were 2 cases of failed ventilation (6.67%) with LTS II, which were later intubated with ETT ($p>0.001$).The reason for poor ventilation in LTS II group may be due to the higher resistance encountered to the airflow because of the smaller ventilation outlets of the LTS II and the fact that these orifices are frequently not positioned directly over the laryngeal inlet. This is in agreement with the various studies conducted on LTS which have found successful ventilation in only 75-80% of the cases. (16, 17, 18)

On removal of the device blood was seen more often on LTS II. 2 patients with 2 attempts of placement of LTS II had blood on device because of more manipulation of the airway and since overall there was more manipulation of the airway in LTS II group, this could be a reason for higher number of patients with blood on device in this group. In various studies, it was concluded that the laryngeal tube may cause injury to the pharynx and incidence of blood detected on the device at removal was 0–7% (19,20). This range is similar to, or possibly lower than, the incidence caused by the laryngeal mask airway (0.4–50%).(21)

The LTS II device has significantly increased incidence of sore throat at 6 hour post-extubation as compared to the I-gel. The reported incidence of postoperative airway complications with LTS II, such as sore throat, dysphagia, dysphonia or numbmouth, ranges from 0 to 34% in various studies. The lower incidence of sore throat in our study can be attributed to the soft non- inflatable mask of I-gel.

The findings of this study must be considered in the context of its limitations. First, anesthesiologists supervising the device insertion were not blinded and were responsible for the study conduct and outcomes. Second, the observer who measured the insertion times was not blinded to the type of device being used. Third, the two supraglottic airway devices that were investigated are not frequently used in the operating room for routine surgical cases; however, they have wide applicability in life-threatening situations when non-anesthesia trained personnel may need to secure an airway. Lastly the study was not powered to draw conclusions on small differences in airway morbidity.

V. Conclusions

We concluded that I-gel is a simple, excellent and easy to insert SGA device with maintenance of airway in a short time. However more studies with large number of patients are required to further validate our results before recommending its widespread use over LTS II. Finally, this study is relatively small and while it shows that the I-gel appears to be fairly efficacious, it offers almost no useful evidence of the safety of the I-gel over LTS II, which requires data from a considerably larger cohort in routine practice.

References

[1]. Asai T, Shingu K: The laryngeal tube. Br J Anaesth 2005; 95:729–36
[2]. Gaitini LA, Vaida SJ, Somri M et al: A randomized controlled trial comparing the ProSeal Laryngeal Mask Airway with the Laryngeal Tube Suction in mechanically ventilated patients. Anesthesiology 2004; 101:316–20
[3]. Cook TM, Hommers C: New airways for resuscitation? Resuscitation 2006; 69:371–87

[4]. Dorges V, Ocker H, Wenzel V et al: The Laryngeal Tube S: A modified simple airway device. Anesth Analg 2003; 96:618–21
[5]. Cook TM: The Laryngeal Tube Sonda (LTS) and the LTS II. Acta Anaesthesiol Scand 2006; 50:521–2
[6]. Mihai R, Knottenbelt G, Cook TM: Evaluation of the revised laryngeal tube suction: The laryngeal tube suction II in 100 patients. Br J Anaesth 2007;99: 734–9
[7]. Genzwuerker HV, Altmayer S, Hinkelbein J et al: Prospective randomized comparison of the new Laryngeal Tube Suction LTS II and the LMA-ProSeal for elective surgical interventions. Acta Anaesthesiol Scand 2007; 51:1373–7
[8]. Jacobs PE, Grabinsky A. Advances in prehospital airway management. Int J llln Inj Sci.2004; 4 (1):57-64.
[9]. Chen X, Jiao J, Cong X.A et al Comparison of the Performance of the I-gel vs. the LMA-S during Anesthesia: A Meta-Analysis of Randomized Controlled Trials. PLoS ONE 8(8):e 71910. Aug 2013.
[10]. Esa K, Azarinah I, Muhammad M etal. A comparison between Laryngeal Tube Suction II Airway and Proseal Laryngeal Mask Airway in laparascopic surgery. MZ Med J Malaysia. 2011 Aug; 66(3):182-6
[11]. Zand F, Amini A, Sadeghi SE et al .A comparison of the laryngeal tube-S and Proseal laryngeal mask during outpatient surgical procedures. Eur J Anaesthesiol. 2007 Oct;24(10):847-51. Epub 2007 Jul 3.
[12]. Roth H[1], Genzwuerker HV, Rothhaas A et al .The ProSeal laryngeal mask airway and the laryngeal tube Suction for ventilation in gynaecological patients undergoing laparoscopic surgery. Eur J Anaesthesiol. 2005 Feb;22 (2):117-22.
[13]. Ashish Kannaujia, Uma Srivastava, [...], and Surekha Saxena A Preliminary Study of I-Gel: A New Supraglottic Airway Device. Indian Journal of Anaesthesia 2009 Feb 53(1):52-56.
[14]. Kikuchi T, Kamiya Y, Ohtsuka T et al : Randomized prospective study comparing the laryngeal tube suction II with the ProSeal laryngeal mask airway in anesthetized and paralyzed patients. Anesthesiology 2008; 109 **;**(1);54-60
[15]. Cattano D, Ferrario L, Patel C B et al: Laryngeal Tube Suction-D, Combitube, and Proseal Laryngeal Mask Airway: Randomized Clinical Trial. journal of Anesthesiology and Clinical Science 2012, 1:8.
[16]. Cook TM, Cranshaw J. Randomized crossover comparison of ProSeal laryngeal mask airway with laryngeal tube Sonda during anaesthesia with controlled ventilation. Br J Anaesth 2005; 95: 261–6
[17]. Kette F, Reffo I, Giordani G et al: The use of laryngeal tube by nurses in out-of-hospital emergencies: preliminary experience. Resuscitation 2005, 66(1):21–25.
[18]. Heuer JF, Barwing J, Eich C et al: Initial ventilation through laryngeal tube instead of face mask in out-of hospital cardiopulmonary arrest is effective and safe. Eur J Emerg Med 2010, 17(1):10–15.
[19]. Asai T, Shingu K, Cook T. Use of the laryngeal tube in 100 patients. Acta Anaesthesiol Scand 2003; 47: 828–32.
[20]. Brimacombe J, Keller C, Brimacombe L. A comparison of the laryngeal mask airway ProSealTM and the laryngeal tube airway in paralyzed anesthetized adult patients undergoing pressure controlled ventilation. Anesth Analg 2002; 95: 770–6
[21]. Brimacombe JR. Laryngeal Mask Anesthesia: Principles and Practice, 2nd edn. Philadelphia: Saunders, 2005.

Table 1: Demographic characteristics

Variables	Group L	Group I	p-value	Remarks
Age (years)	44.71 ± 14.32	40.73 ± 14.69	0.301	NS
BMI (kg m^2)	27.11 ± 3.15	26.90 ± 4.40	0.837	NS
Male/female (%)	20.00/80.00	13.33/86.67	0.213	NS

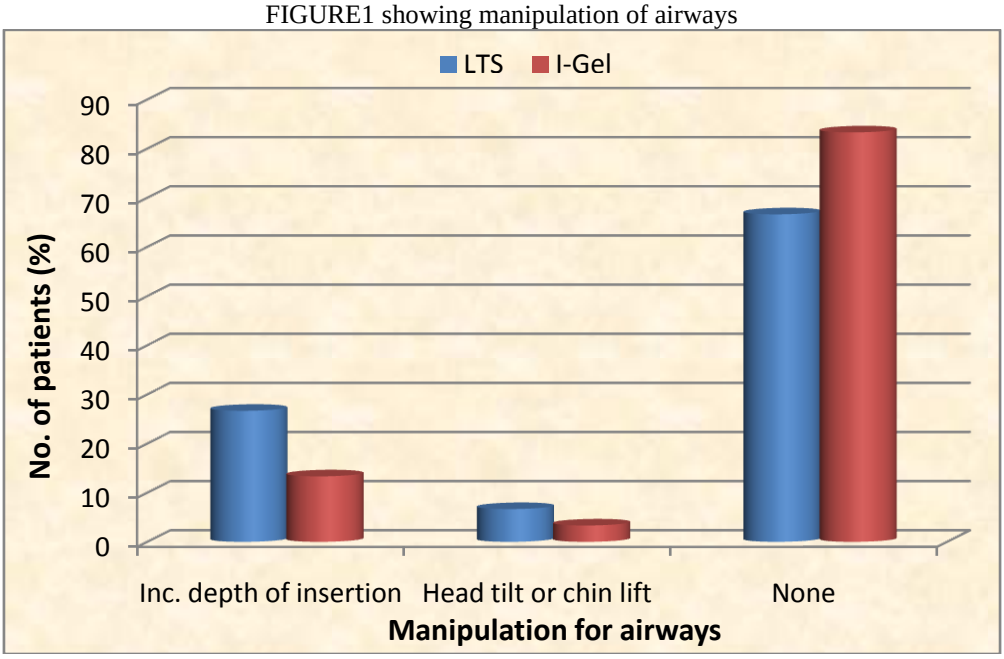
NS: Non-significant
S: Significant

Table 2: Comparison of different variables

Variables	Number of patients(%)			
	Group L	Group I	P value	Remarks
No. of Insertion attempts (%)			0.010	S
1	28 (93.33)	30 (100.00)		
2	2 (6.67)	0 (0.00)		
Mean insertion time (sec)	8.89±5.49	4.33±1.12	0.002	S
Ease of insertion			0.050	S
V easy	22 (73.33)	25 (83.33)		
Easy	4 (13.33)	3 (10.00)		
Difficult	2 (6.67)	2(6.67)		
V Difficult	2 (6.67)	0 (0.00)		
Ventilation			0.001	S
Good	18 (60.00)	30 (100.00)		
Fair	10 (33.33)	0 (0.00)		
Failed	2 (6.67)	0 (0.00)		
Tolerance (%)			0.071	NS
comfortable	30(100)	29(96.67)		
Cough	0(0.00)	1(3.33)		
Suction contents(%)			0.213	NS
Saliva	24(80.00)	26(86.67)		
Blood	6 (20.00)	4(13.33)		
Blood on device(%)			0.020	S
Yes	8 (26.67)	4 (13.33)		
No	22 (73.33)	26 (86.67)		

NS: Non-significant
S: Significant

FIGURE1 showing manipulation of airways



Loveleen Kour*. "I-Gel versus Laryngeal Suction Tube- II: Comparison of Two Supraglottic Airway Devices in Elective Surgical Procedures." IOSR Journal of Dental and Medical Sciences (IOSR-JDMS), vol. 17, no. 12, 2018, pp 08-14.